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A formwork module for a waffle slab foundation

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(56) Related Art
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(57) Abstract

A formwork module for use in the construction of a waffle slab foundation and being adapted to co-operate with other formwork modules so as to provide void forming structures separated by channels, said formwork module comprising at least two spaced apart void forming members interconnected by channel means, said channel means being integrally formed between the said void forming members, wherein a first formwork module is adapted to be abutted against at least a second formwork module for alignment of the channel means of the first formwork module with the channel means of the at least second formwork module, whereby a void forming structure is formed by alignment of the void forming member of the first formwork module with the void forming member of the at least second formwork module.

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ORIGINAL

COMPLETE SPECIFICATION

PETTY PATENT

TO BE COMPLETED BY THE APPLICANT

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INVENTION TITLE:	A FORMWORK MODULE FOR A WAFFLE SLAB FOUNDATION
DETAILS OF ASSOCIATED PROVISIONAL APPLICATION NO(S):	PQ 1718 - 19 July 1999 - Australia

The following statement is a full description of this invention including the best method of performing it known to me:-

The present invention relates to building foundation systems and, in particular, to an element of formwork that can be used in the construction of a building foundation for a home or the like. More specifically, the present invention relates to a formwork module for use in the construction of a waffle slab foundation whereby one formwork module can co-operate with other formwork modules so as to provide void forming structures separated by channels.

In recent years, it has become common home building practice to use a plurality of separate polystyrene pods or void forming elements to create a waffle slab foundation that provides a safe and cost effective alternative to more traditional foundations.

However, the polystyrene pods employed for this purpose pose a long term threat to the environment, both as a result of leaching of the polystyrene into the surrounding environment and by the environmentally unfriendly polystyrene manufacturing and waste disposal processes.

Furthermore, the set up time for waffle slab foundations is considered a major contributor of labour costs. For instance, after the formwork border walls have been erected, flexible plastic sheeting is laid onto the ground within the border walls and the pods are laid in a desired grid pattern separated by spacers laid simultaneously so as to define the location of the ribs of the foundation. Bar chairs are then located within the channels between the pods, and steel rods are located on the bar chairs in the channels so as to reinforce the strength of the ribs to be formed within the channels after the pouring of concrete over the formwork. Bar chairs are also located on the pods and steel meshwork is then located on these bar chairs and over the entire formwork so as to provide the desired continuous strength throughout the slab when

constructed. Only after all these steps have been carried out can concrete be poured over the formwork.

If the pouring is done carelessly or if the various elements of the formwork are not at their correct locations prior to pouring, the formwork may start to move from its desired position as a result of uneven pressures exerted upon it by the still fluid concrete during, or even after, pouring. It is not uncommon during the pouring of the concrete for the reinforcing rods and meshwork to collapse from their desired bar chair supported locations or for the pods to "float" free of their spacers to positions remote from their desired rib defining positions and so compromise the strength of the waffle slab foundation. These movements may be exacerbated by the smooth plastic sheeting upon which the pods and channel spacers are located.

The presence of so many different elements of formwork also adds to the cost of laying a waffle slab foundation, particularly as the plastic sheeting, pods, spacers, bar chairs, reinforcing rods and meshwork are not necessarily all from the same manufacturer or supplier.

Furthermore, the plastic sheeting upon which the pods and channel spacers are located may have cuts or punctures at locations which may enable white ants or other ground burrowing pests to infiltrate the formwork and ultimately damage the foundation. Such punctures of the plastic sheet may also allow the passage of water therethrough, thus compromising the required water proofing feature of the plastic sheet, which is normally fabricated of polythene, and heightening the risk of polystyrene leaching into the surrounding environment.

It is an object of the present invention to provide a formwork module for use in the construction of a building foundation that combines many of the

features of existing formwork elements used for constructing a waffle slab foundation.

It is another object of the present invention to provide a formwork module that is less hazardous to the environment than existing formwork elements.

It is yet another object of the invention to provide a formwork module that can be used to construct a building foundation more quickly and with less likelihood of concrete pour related disruptions of the formwork structure than existing systems.

It is still another object of the invention to overcome, or at least substantially ameliorate, the disadvantages and shortcomings of the prior art.

According to the invention, there is provided a formwork module for use in the construction of a waffle slab foundation and being adapted to co-operate with other formwork modules so as to provide void forming structures separated by channels, said formwork module comprising at least two spaced apart, box shaped, void forming members having vertical side walls and being interconnected by channel means, said channel means being defined between the said void forming members, wherein the vertical side walls of the void forming members of a first formwork module are adapted to be abutted against the vertical side walls of the void forming members of at least a second formwork module for alignment of the channel means of the first formwork module with the channel means of the at least second formwork module, whereby a void forming structure is formed by alignment of the void forming member of the first formwork module with the void forming member of the at least second formwork module.

Preferably, the formwork module includes one or more brackets integrally formed with the channel means, the one or more brackets extending between opposed vertical side walls of void forming members which define the

channel means so as to support a reinforcing rod at an elevated location from a floor of the channel means.

It is also preferred that each of the box shaped, void forming members further include means for supporting reinforcing meshwork at an elevated location from an upper surface of the void forming member, said meshwork supporting means being integrally formed with at least the said upper surface of the void forming member so that no relative movement of the meshwork supporting means to the void forming member occurs during pouring of concrete in the construction of the waffle slab foundation.

In order that the invention may be readily understood and put into practical effect, reference will be made to the accompanying drawings, in which:-

Fig 1 is a perspective view of a formwork module according to a first embodiment of the present invention,

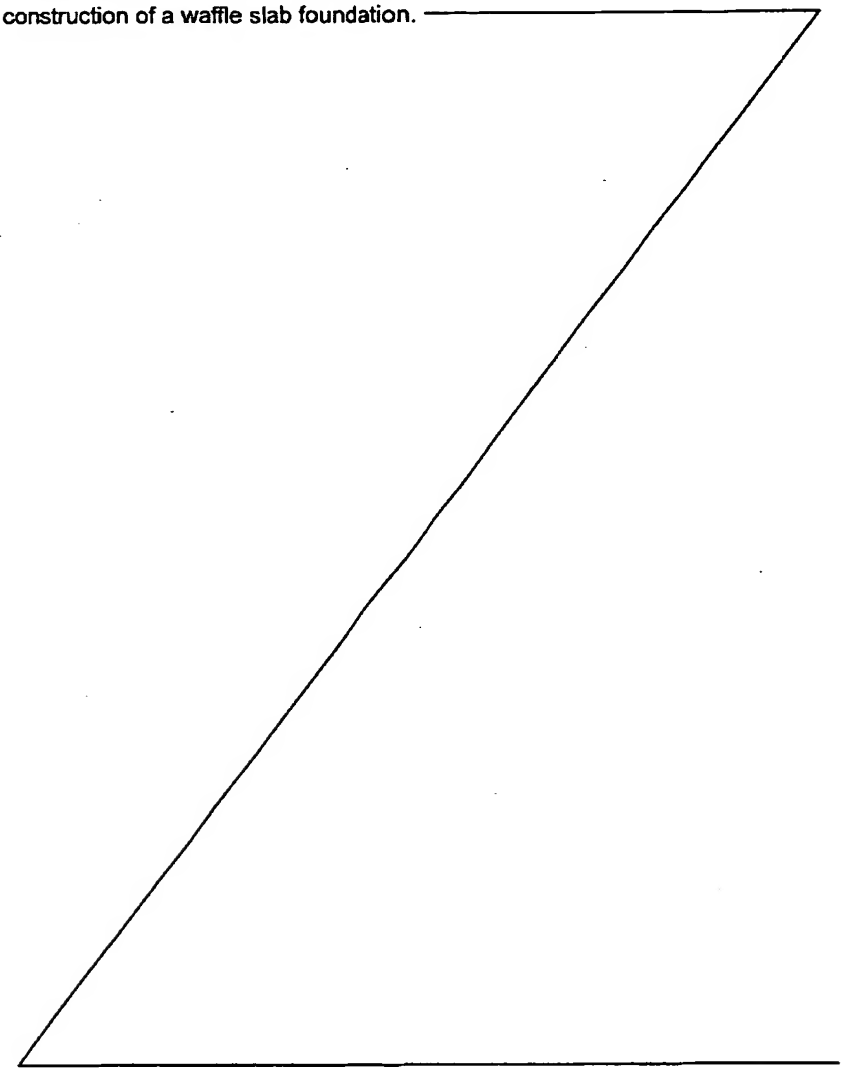
Fig 2 is a perspective view of a void forming member that may be used in a formwork module according to another embodiment of the present invention,

Fig 3 is a perspective view of a modular formwork construction produced by abutment of four formwork modules according to yet another embodiment of the invention, and

Fig 4 is a perspective view of a modular formwork construction produced by abutment of four of the modules of Fig 1 supporting steel meshwork.

The formwork module 58 shown in Fig 1 is preferably fabricated of recycled plastic and consists of four spaced apart void forming members 60, 62, 64, 66 secured to or integrally formed with a cruciform shaped base or floor

68 which covers the ground completely between the spaced apart members 60, 62, 64, 66, whereby the members 60, 62, 64, 66 are separated by intersecting channels 70, 72. The formwork module 58 is used in the construction of a waffle slab foundation.



Each member 60 has a suitably strengthened, main box-shaped body 74 and a meshwork supporting single elongated rib portion 76 which is integrally formed with the upper surface of the body 74. Each member 60 is identical in height and is a quarter the length and width of an assembled void forming structure 84, as shown in Fig 4, where four formwork modules 58 are abutted together to form a square shaped, modular formwork construction 86. The width of the channel 70 is the same as the width of the channel 72.

The void forming member 10 shown in Fig 2 may be used as part of an integrally formed formwork module, such as that shown in Fig 1, by replacing all four members 60, 62, 64, 66. The member 10 has a main box-shaped body 18 and a pair of elongated rib portions 20, 22 which are integrally formed with the upper surface 24 of the body 18. The rib portions 20, 22 are adapted to support reinforcing meshwork at an elevated location from the upper surface 24 of the body 18. The body 18 may be suitably strengthened, say, by an internal frame structure or by corrugated walls, so as to prevent collapse or compression thereof during and after the pouring of concrete.

Referring again to Fig 1, and also to Fig 4, within each channel 70, 72 there are one or more brackets 78 which span or extend between the opposed walls of adjacent members 60, 62, 64, 66 and are adapted to support reinforcing rods 88 at an elevated location from the floor 68 so that the rod 88 may extend parallel to the longitudinal direction of the channel 70, 72. The rod 88 is intended to be positioned in a trough 90 formed in the brackets 78. The brackets 78 may be secured to, or integrally formed with, the members 60, 62, 64, 66.

Each of the formwork modules 92, shown abutted together to form a square shaped, modular formwork construction 94 in Fig 3, differ from the formwork module 58 shown in Fig 1 by the location of the brackets 78. The

brackets 78 of each module 92 span or extend between the opposed walls of adjacent members at the end of each channel 70, 72, so that the brackets 78 are substantially planar or continuous with the outer surfaces of the members. When any two modules 92 are abutted together so that their channels 70, 72 are aligned, two brackets 78 should also abut together, thus increasing the load bearing strength and resistance to deformation of the combined brackets under the weight of a reinforcing rod and concrete.

An assembled void forming structure 84 may be formed by abutting four modules 58, 92 together to define a four sided or square shaped, modular formwork construction 86 (as shown in each of Figs 3 and 4). In so doing, the channels 70, 72 are aligned between all four modules 58, 92, whereby a cruciform internal rib of the waffle slab foundation is created when the concrete is poured. However, in bringing four modules 58, 92 together in this manner, only a single void forming structure is assembled, and so in order to assemble more such void forming structures, more modules 58, 92 need to be brought together in aligned, abutting relationship to create the required formwork for the construction of a waffle slab foundation. As shown in Fig 4, reinforcing rods 88 and meshwork 96 may then be placed on the modular formwork construction 86.

It is an advantage of the preferred formwork module of the invention that it combines the features of a pod (when suitably co-operating with other such formwork modules), a spacer, a portion of plastic sheeting to cover the ground and bar chairs located on the pod and on the ground for supporting reinforcing elements, which would otherwise be utilized as separate elements of formwork in the construction of prior art waffle slab foundations.

Various other modifications may be made in details of design and construction without departing from the scope or ambit of the invention. For

instance, the modules 58, 92 may be clipped together in aligned, abutting relationship to create the required formwork with the use of suitable locking means. Also, the modules themselves may be assembled from a set of preformed panels that clip together in a predetermined manner.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A formwork module for use in the construction of a waffle slab foundation and being adapted to co-operate with other formwork modules so as to provide void forming structures separated by channels, said formwork module comprising at least two spaced apart, box shaped, void forming members having vertical side walls and being interconnected by channel means, said channel means being defined between the said void forming members, wherein the vertical side walls of the void forming members of a first formwork module are adapted to be abutted against the vertical side walls of the void forming members of at least a second formwork module for alignment of the channel means of the first formwork module with the channel means of the at least second formwork module, whereby a void forming structure is formed by alignment of the void forming member of the first formwork module with the void forming member of the at least second formwork module.

2. The formwork module of claim 1 and further including one or more brackets integrally formed with the channel means, the one or more brackets extending between opposed vertical side walls of void forming members which define the channel means so as to support a reinforcing rod at an elevated location from a floor of the channel means.

3. The formwork module of claim 1 or claim 2 wherein the box shaped, void forming members further include means for supporting reinforcing meshwork at an elevated location from an upper surface of the void forming member, said meshwork supporting means being integrally formed with at least the said upper surface of the void forming member so that no relative movement of the

meshwork supporting means to the void forming member occurs during pouring of concrete in the construction of the waffle slab foundation.

Dated this 13th day of October, 2000

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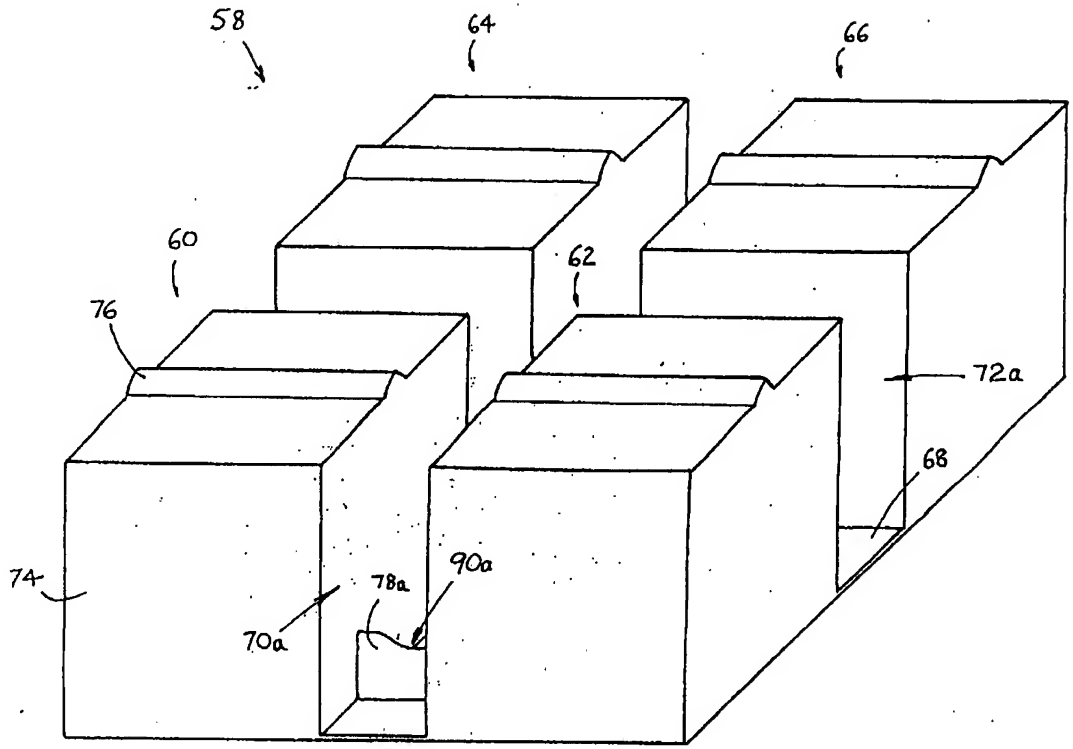

Fig. 1

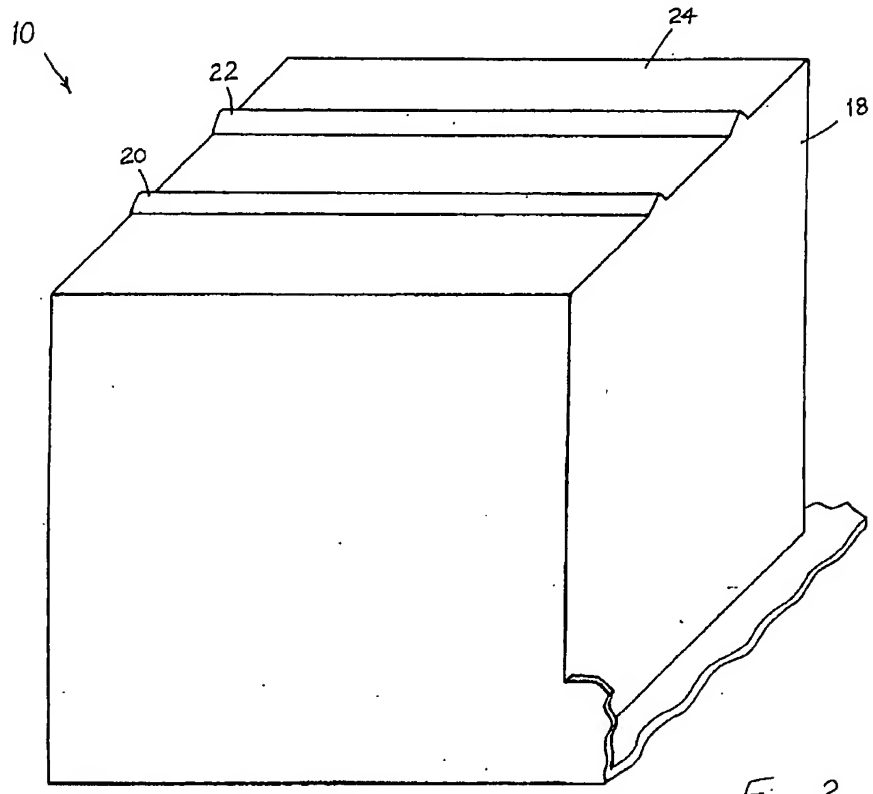

Fig. 2

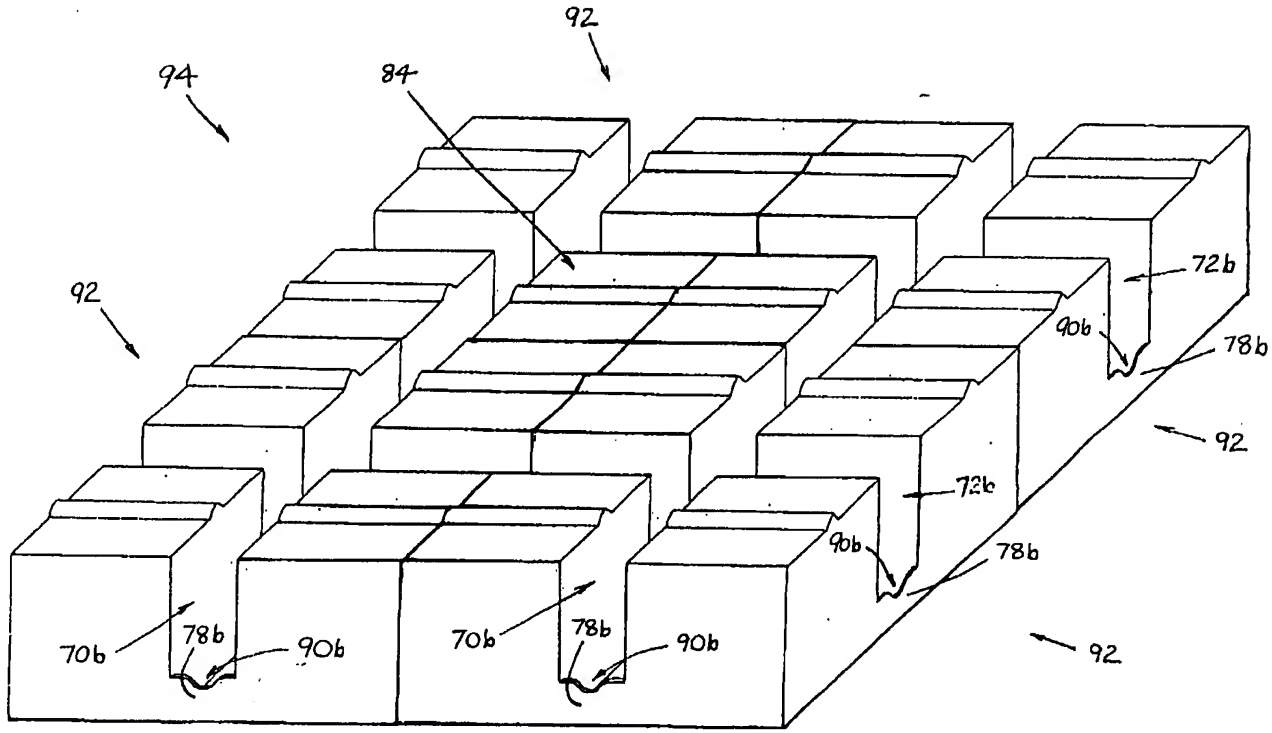

Fig. 3

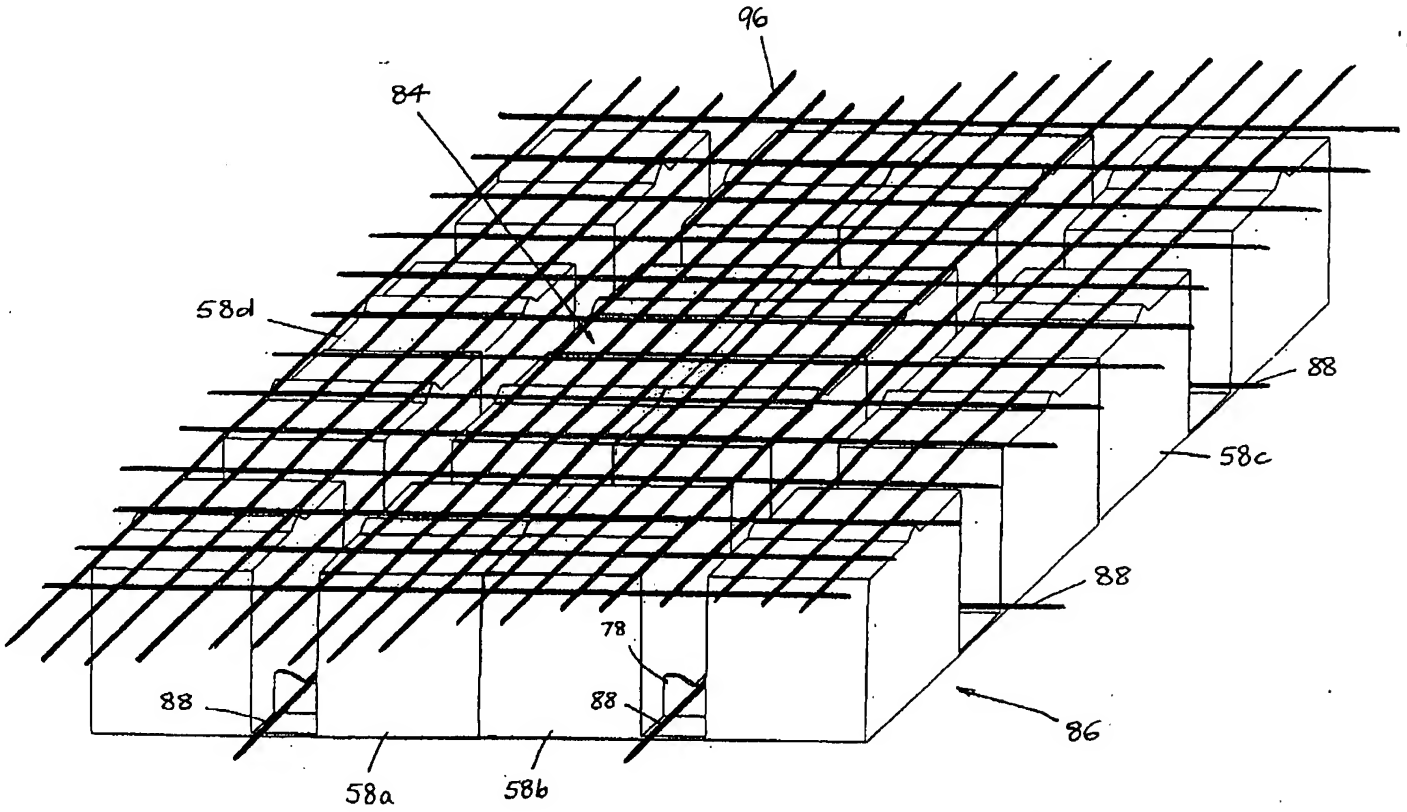

Fig. 4